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Editorial

Chrono-epileptology: Time to reconsider seizure timing

Epileptic seizures frequently do not occur randomly throughout the day but follow day and nighttime patterns. These patterns may be related to wakefulness and sleep, time of day, and to internal biological clocks.

Day and nighttime patterns of seizures have been tied to some of the very first descriptions of seizures. Giants in the field, such as Fritz Dreifuss, recognized the importance of these patterns in the treatment of seizures several decades ago.[1] But only in the last decade have more detailed methods of characterizing day and nighttime patterns of different epilepsy types become available, and only in the last few years has it become possible to differentiate between time of day and truly circadian internal markers. Work has been and will further be facilitated by improved measures to record seizure timing, and by improved measures to read internal clocks. Implementation of Video-EEG and 24-hour monitoring, progress in electronic ambulatory seizure diaries and seizure detection devices provide better seizure time records. The discovery of additional biomarkers that may contribute to seizure susceptibility at certain times, such as cortisol or melatonin levels and circadian genes are helping us better to read the internal clock.[2] You may ask 'Why bother?'

An understanding of a person's propensity to seize at certain times may allow us to construct individual seizure susceptibility profiles which could guide treatment. Medications may be adjusted, with higher doses of medications at times or greatest seizure susceptibility,[3,4] and this may also apply to other treatment strategies, such vagus nerve, deep brain or cortical stimulation and medication pumps. Tracking of seizure times and treating seizures by the clock has been termed chrono-epileptology. Why should epilepsy be treated differently than any other chronic condition such as hypertension or diabetes mellitus? In these conditions, a combination of longer and shorter acting medications or even medication pumps provide the highest dose of medications at peak times of symptoms. The discovery of better epilepsy biomarkers in the coming years, similar to glucose levels in diabetes mellitus or blood pressure in hypertension may allow us to assess epileptogenicity even more precisely. Efforts are underway to provide such biomarkers and some EEG triggered implantable devices are coming close to reliably predicting seizure susceptibility. While less invasive broadly applicable seizure prediction systems are under development, we may be able to start treating seizures using internal clocks and peak times of seizures in seizure diaries.

Chrono-epileptology may not only permit treatment adjustment to times of greatest seizure susceptibility, but may also provide opportunities to adjust so-called zeitgebers. Zeitgebers are stimuli that set the internal clock, for example light and other cues. Interestingly, there are fewer complex partial seizures on sunny days.[5] Does light therapy help? The trial results may be published shortly (http://clinicaltrials.gov/ct2/show/NCT01028456). What is the role of sleep? Do findings apply only to certain seizure subtypes? Can setting the internal clock help with the diagnosis of epilepsies?

Timing of seizures is part of every seizure history and always has been. The time is ripe for a reappraisal. In this edition, Mirzoev et al.[6] take a first step by reviewing this timely topic in patients with focal epilepsy.

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